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PARASITES OF THE SWORDFISH, *XIPHIAS GLADIUS* LINNAEUS[1]

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The parasites were collected from the broadbill swordfish taken by the Lerner-Cape Breton Expedition of The American Museum of Natural History at Louisburg, Nova Scotia, during the summer of 1936.

Four species of cestodes, one species of nematode, and one species of copepod were present in the collection. Of the cestodes, one new species is here reported; all the other parasites have been previously described. The present paper also reviews other parasites of the swordfish reported in the literature.

TREMATODES

Although no trematodes were present in the collection, several species are known to occur in the swordfish. Two of these are monogenetic and found on the gills. Goode (1880), in his paper on 'Materials for a History of the Swordfish,' reported *Tristomum coccineum* Cuvier, 1817, and *T. papillosum* Diesing, 1836. Goto (1894) reported a third species as *T. rotundum*, but this is definitely a synonym of *T. coccineum*. Of the two species, *T. coccineum* is the better known. Linton (1898) reported the presence of the parasite on the gills of swordfish taken at Woods Hole, Mass.

These trematodes are broad, flat, and oval in shape. There is a pair of anterior suckers, one on each side of the mouth. At the posterior end there is a large ventral sucking disc. The intestine has numerous lateral branches; testes are numerous, intracecal, and located posterior to a single ovary. Male and female openings are separate, anterior, ventral, and near the lateral margin of the body.

Tristomum papillosum differs from *T. coccineum* in that the hind sucker is situated closer to the posterior margin and the dorsal surface is covered with many papillary appendages. This species is yellowish white in appearance while *T. coccineum* is vermilion red.

[1] Results of the Michael Lerner Ichthyological Expeditions, No. 14.
[2] New York Aquarium.

One species of digenetic trematode often found in the stomach of the swordfish belongs to an interesting group of large forms referred to the genus *Hirudinella* Garsin, 1730. The history and synonymy of the group is rather complicated. Manter (1926) redescribed this parasite of the swordfish from the collection of Dr. H. B. Ward and named it *Hirudinella fusca* (Poirier, 1885) (= *Distomum fuscum* Poirier) (= *D. verrucosum* Poirier) (= *D. clavata* of Linton, 1898). However, according to Stiles and Hassall (1908), the name *Distomum fuscum* Poirier should read *D. fuscum* (Bosc, 1802) Poirier, 1885. Bosc originally described the parasite as *Fasciola fusca* from the stomach of the "dorade" (Coryphaenae?). Therefore, Manter's name for this parasite should have been *Hirudinella fusca* (Bosc, 1802). But according to Baird, 1853, *Hirudinella fusca* (Bosc, 1802) is a synonym of *Hirudinella ventricosa* (Pallas, 1774) (= *D. ventricosum*) (= *Fasciola ventricosa*). For this reason, if Baird's opinion is correct, the name of the swordfish parasite described by Manter (1926) becomes *Hirudinella ventricosa* (Pallas, 1774). *Distomum coryphaenae hippuridis* Tilesius, *D. coryphaenae* of Rudolphi, and *D. clavatum* of Owen are also considered synonyms of *Hirudinella ventricosa* (see Stiles and Hassall).

Manter's (1926) description of *H. ventricosa* is based on 60 specimens varying from 7 to 23 mm. in length and from 2.5 to 5 mm. in width. The body is strongly marked with transverse folds and the region anterior to the ventral sucker (acetabulum) is narrower than the region posterior to this sucker. The mouth and oral sucker are sub-terminal, the acetabulum is large; and the body wall is thick. The oral sucker opens directly into the pharynx; the esophagus has two lateral "crops" which are directed dorsally and anteriorly. From the esophagus, two intestinal rami pass posteriorly filling the entire hind end of the body. The excretory pore is at the posterior tip of the worm; the genital pore is median, ventral, and near the oral sucker. The testes lie obliquely behind the acetabulum. The seminal vesicle is anterior to the sucker, and leads into the cirrus sac; the latter contains the pars prostatica, the terminal portion of the uterus and the ejaculatory duct. The ovary lies just posterior to the testes and the oötype (Mehlis' gland) posterior to the ovary. The uterus coils posteriorly between the two intestinal branches up to the anterior border of the hind third of the worm.

According to Stiles and Hassall (1908), Blainville, 1824, was the first to place a member of this group in the genus *Hirudinella* and in 1828

designated *Hirudinella clavata* (Menzies, 1791) (= *Distomum clavatum*) (= *Fasciola clavata*) as the type. This parasite is found in the stomach of *Scomber pelamys*. Such forms as *Hirudinella marina, Distomum scombri pelamidis* Tilesius, and *D. coryphaenae* (Bosc) (= *Fasciola coryphaenae*) are considered synonyms.

Hirudinella clavata has also been described from the stomach of the swordfish. Although it has been shown that trematodes described as *Distomum clavatum* by Owen and Linton are now regarded as *Hirudinella ventricosa*, it cannot be stated with certainty that *Hirudinella* (*Distomum*) *clavata* described from the swordfish by other investigators (see Stiles and Hassall) are likewise referable to this species. The fact that a single species of worm parasite may be described from a great variety of hosts is well known. Until further studies have been made, those forms described from the stomach of the swordfish as *Distomum clavatum* must remain as *species inquirenda.*

Besides *Distoma ventricosa* = *Hirudinella ventricosa*, Goode (1880) mentions a second species of digenetic trematode from the intestine of the swordfish described by Rudolphi, 1819, as *Distoma dendriticum.* Looss (1899) pointed out that the name *Distoma* is not a generic but a group name, and therefore referred this species to the genus *Dicrocoelium.* However, this genus, like *Fasciola*, included a great variety of forms and since then has been reserved for trematodes infecting warm-blooded animals. Since its exact taxonomic position is not known, *Distoma dendriticum* Rudolphi also remains as *species inquirenda.*

MacCallum and MacCallum (1916) described an interesting monostome from the gill cavity and muscle of swordfish taken at Woods Hole, Mass. They named this parasite *Koellikeria xiphiados.* Recently, Ishii (1935) in a revision of the family Didymozoonidae referred this swordfish monostome to the genus *Didymocystis* Ariola, naming it *D. xiphiados* (MacCallum and MacCallum, 1916) (= *Koellikeria xiphiados*). The members of this genus have the following characters: didymozooninae encysted in pairs. Forebody slender, elongated. Hindbody swollen, reniform, comma-shaped or semiglobular. Oral sucker present or absent. Pharynx present. Ventral sucker absent. Intestine present. Genital pore near oral sucker. Testes tubular, more or less elongated in hindbody, and begin near base of forebody. Ovary and vitellarium tubular. Shell gland and receptaculum seminis present. Uterus long, with exceptionally large numbers of eggs.

CESTODES

I.—**Dibothrium plicatum** Rudolphi, 1819

Figure 1[1]

Echinorhynchus xiphiae Gmelin, 1790
Bothriocephalus truncatus Leuckart, 1819

GENERIC CHARACTERS.—Head short, oblong, orbicular, unarmed; bothria two, lateral, each with a shallow concavity and thickened edges. Neck long, ripe proglottids short, sharply emarginated at the posterior end.

Two complete specimens were present in the collection. One measured 75 mm. in length and 10 mm. in width. The neck region was only 4 mm. in length. The other complete worm measured 100 mm. in length and 7 mm. in width, while the neck region was extended to 15 mm. The bothria are slightly concave with thick edges, the posterior borders projecting slightly. The entire neck is usually found enclosed in a cyst-like structure buried in the lining of the digestive tract. In one case, the necks of two worms were found in the same cyst, which superficially gave it an appearance of a double-bodied monster. These are sexually matured cestodes and the strobilia at the anterior end are narrower and less emarginated than those of the posterior segments.

This species was first described from swordfish of American waters by Linton in 1891.

With the exception of the above species, all the cestodes to be described belong to the large group of fish tape-worms known as the Tetrarhynchidea. Since the complete life-history is not known for any of the marine species, Dollfus (1929, 1930) divided the order into two groups: Acystidea in which the larva is a plerocercoid; and Cystidea, in which the larva is a tailed or tailless cysticercoid (plerocerous). In 1935, however, he states that this division is "tout à fait inexact," for the larval stages of *Nybelinia* and *Tentacularia* which were considered plerocercoid were actually plerocerous forms without their blastocysts, i.e., reduced to a scolex with an appendix. Furthermore, it has been shown that any of the larval tetrarhynchids can re-encyst in other fish, which accounts for the presence of a single species in a great variety of hosts.

The classification used here for the tetrarhynchids of the swordfish is based on Dollfus' (1929) interpretations of the various genera. He reduced the number of the already described genera from 36 to the following 14: *Tentacularia* Bosc, *Floriceps* Cuvier, *Gymnorhynchus* Rudolphi, *Dibothriorhynchus* Blainville, *Pterobothrium* Diesing, *Tetra-*

[1] Photographs by S. C. Dunton, N. Y. Aquarium.

rhynchobothrium Diesing, *Otobothrium* Linton, *Eutetrarhynchus* Pintner, *Lacistorhynchus* Pintner, *Sphyriocephalus* Pintner, *Nybelinia* Poche, *Grillotia* Guiart, *Armandia* Guiart, *Gilquinia* Guiart. To this list he added four new genera: *Sbesterium*, *Oncomegas*, *Poecilancistrium* and *Trigonolobium*, which brings the total to 18.

With the exception of *Hepatoxylon* Bosc, which was placed among *genera inquirenda*, the following were either discarded or reduced to synonomy: *Anthocephalus*, *Balanforus*, *Bothriorhynchus*, *Acanthorhynchus*,

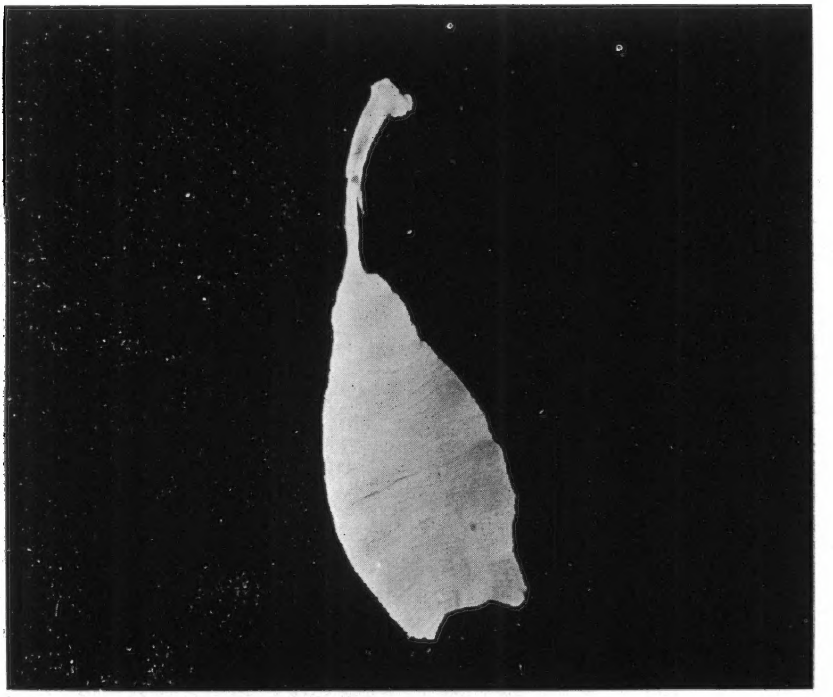

Fig. 1. *Dibothrium plicatum* Rudolphi. About × 2 (incomplete worm).

Tetrarbothriorhynchus, *Stenobothrium*, *Synbothrium*, *Syndesmobothrium*, *Aspidorhynchus*, *Abothros*, *Coenomorphus*, *Wageneria*, *Halysiorhynchus*, *Acoleorhynchus*, *Bouchardia*, *Rufferia*, *Pierretia*, *Vaullegeardia*, and *Dibothriorhynchus* of Diesing.

Both *Tetrarhynchus* and *Rhynchobothrium*, like *Distomum* of the trematodes, are group names. The large number of cestodes described under these two genera have since been reclassified and distributed among the recognized genera mentioned above. Thus the tetrarhynchid

parasites of the swordfish, formerly described under these two genera, have now been placed in one of the following genera: *Tentacularia*, *Nybelinia*, or *Dibothriorhynchus*.

II.—**Dibothriorhynchus attenuatus** (Rudolphi, 1819)

Figure 2

Tetrarhynchus attenuatus Rudolphi, 1819
Tetrarhynchus attenuatus of Olsson, 1868
Bothriocephalus claviger (Leuckart, 1820)
Coenomorphus linguatula of Lönnenberg, 1891
Rhynchobothrium attenuatum (Rudolphi) of Linton, 1896, etc.
Dibothriorhynchus xiphiae MacCallum, 1921

The genus is characterized as follows: larval plerocercoid; body more or less flattened, linguiform in short individuals, ribbon-like in long forms, smooth in expanded individuals and wrinkled in contracted worms. Posterior end of the body terminates in a small retractile protuberance, tip of which contains the excretory pore. The thickened anterior region containing the bothria is sharply demarcated from the rest of the body. Bothria two, deep, strong, varying in shape with the state of contraction. Bothroidal cavity separated into two by a longitudinal fold, more or less pronounced posteriorly, but not a true septum. Bothria deeply encased in the body of the scolex. Posterior borders of the bothria thickened. Proboscides short, thick, club-shaped, or globulose; rigid and straight. The hooks are hollow, similar in size except at the base where they are slightly smaller; all uniformly arranged. Pars vaginalis relatively short; retractile bulbs slightly elongated, oriented obliquely or transversely.

Dibothriorhynchus attenuatus is a larval cestode that is usually found in large numbers in the body cavity of the swordfish. Linton (1896) recovered over 50 specimens from four fish. These were found attached to the peritoneal lining of the stomach and intestine. The present collection contains 23 worms, ranging in size from 27 × 4 mm. to 70 × 5 mm. In strongly contracted worms, the body is wrinkled, while in the expanded state the body is more or less smooth. Four hooked proboscides are present, two on each bothrium. They are club-shaped, measuring a little more than one millimeter in length, and controlled by powerful muscles which are inserted in each of four retractile bulbs. The name "retractile bulbs" is not suitable for these peculiar organs, however, for not only do they serve to contract the proboscides but also to force them out through the sheaths.

MacCallum (1921) reported a species which he called *D. xiphiae*.

These were about the same size as the smaller of *D. attenuatus* but without any specific differences. Therefore *D. xiphiae* is considered synonymous with *D. attenuatus*.

According to Linton (1925) the sexually matured stages of related species of *Rhynchobothrium* = *Dibothriorhynchus* are usually found in the spiral valves of sharks and rays. It is assumed, therefore, that the adult of *D. attenuatum* may eventually be found in similar hosts.

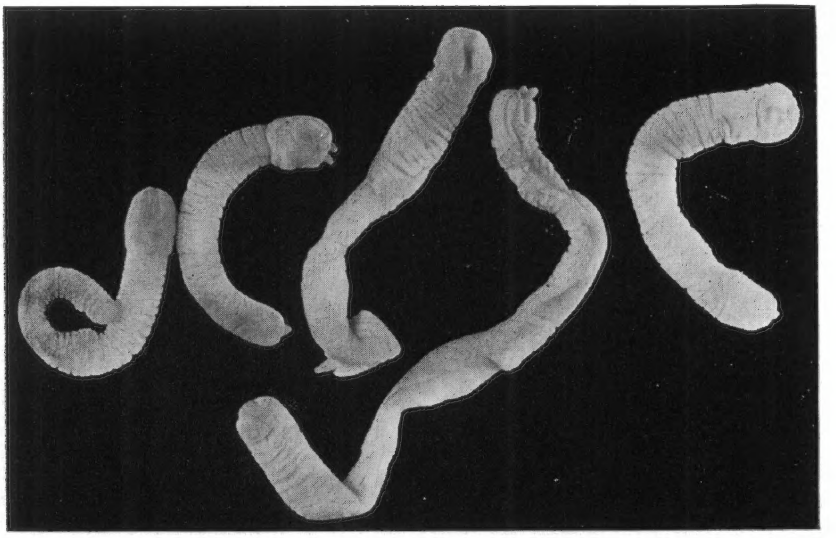

Fig. 2. *Dibothriorhynchus attenuatus* (Rudolphi). About × 2

Two other species of larval *Dibothriorhynchus* have been reported from the swordfish by Linton. In his 1925 paper, he stated that in 1904 he found a few cysts of *Rhynchobothrium imparispine* = *Dibothriorhynchus imparispine* (Linton, 1891) from four swordfish. The adult stage of this species is a common parasite of skates belonging to the genus *Raja*. Again in 1925, he described a new species as *R. uncinatum* = *D. uncinatum* (Linton, 1925). The larval stage of this species was found by V. N. Edwards in the flesh of the swordfish attached to the backbone. The adult and matured stages were found in the thrasher shark, *Vulpecula marina*.

III.—**Tentacularia coryophaena** Bosc, 1802

Bothriocephalus bicolor Bartels, 1832
Tetrarhynchus bicolor (Bartels) Linton, 1896, and others
Tetrarhynchobothrium bicolor of Diesing, 1854

The genus is characterized as follows: larva plerocercoid; body elongated, somewhat cylindrical, composed of a head region and an appendix. Retractile papilla present at the posterior end and contains the excretory pore. Bothria four, extending from the anterior extremity of the body to the base of the appendix; their lateral borders forming eight parallel lines, scarcely raised from the surface of the body, sometimes indiscernible. Each bothrium possesses five grooves: a median one (sulcus intrabothridialis), a right and left one (sulcus bothridialis), and one on the outside of each of these (sulcus circumbothridialis). In the region between the two bothria there is a deep groove called the sulcus medianus. In the area in front of the sulcus circumbothridialis, four small circular orifices are present. These are the cylindrical tubes (rhynchodaeum) through which the proboscides project. The proboscides are short, slender, and slightly curved at the base, gradually widening toward the tip. The hooks are solid, small and slender, regular in arrangement and uniform in distance apart. The basal hooks are small, short, and thick. Retractile bulbs are relatively small, elongate, and banana-shaped.

Linton (1896) first reported the parasite in North American Swordfish. His description for this species is rather incomplete, but the one specimen from the present collection, besides showing the above generic characters, compares favorably with those given by Linton. The dimensions of the specimen (stained and mounted) on hand are as follows: total length 4 mm., width 2.5 mm; length of proboscides 1 mm., width 0.1 mm.; length of contractile bulbs 0.9 mm.; average length of the largest hooks 0.03 mm.

IV.—**Nybelinia lamonteae,** new species

Figures 3 and 4

GENERIC CHARACTERS.—Larva plerocercoid; body composed of so-called head and appendix, shape varying with the state of contraction of the individual. Scolex ordinarily cylindrical, short, and contains bothria which are rounded at the apex and projecting at the lower borders. Retractile papillae is at the extreme end of the appendix and contains the excretory pore. Bothria four, variable in shape, marginal thickenings large; area between adjacent bothria narrow, sometimes lacking, which makes it superficially appear as if only two bothria were present. Ventral and dorsal surfaces of bothria well separated anteriorly, but in contact with each other by their posterior borders. On the right and left sides, the bothria are in contact with each other anteriorly but separated posteriorly. Apex of scolex more or less rounded. The orifices through which the proboscides project are definitely arranged in pairs (2 dorsal and 2 ventral). Hooks variable in number and size. Proboscis sheaths

slightly longer than proboscides. Retractile bulbs relatively short, elongate, banana-shaped in certain forms and ellipsoidal in others.

DESCRIPTION OF TYPE.—Number 13769, American Museum of Natural History.

The present species is distinguished from those previously described from the swordfish by the shape of the proboscides, the arrangement of

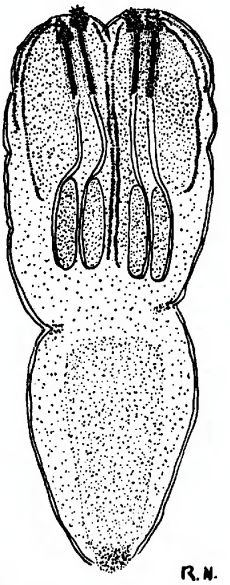

Fig. 3. *Nybelinia lamonteae*, type. × 20

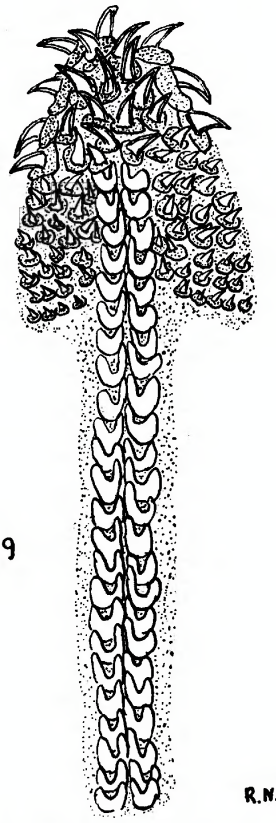

Fig. 4. Proboscis of *Nybelinia lamonteae*. × 210

the hooks on each proboscis, and the presence of closely set spines or spicules around the periphery of each bothrium. The proboscides (Fig. 4) average 0.5 mm. in length. The anterior end of each is spear-head-shaped. This part measures 0.15 mm. in length and 0.12 mm. in width at its base. Large curved hooks are present in approximately the anterior half of the "spear-head" and average about 0.045 mm. in length. The hooks of the posterior half are arranged in rows in an

orderly manner and are from one-third to one-half the size of the larger ones. There are about 20 pairs of hooks that pass posteriorly along the proboscis sheath. These are about as large as the hooks at the anterior end.

The worm was found encysted in the mesentery of the swordfish and measures about 7 mm. in length and 2.5 mm. in width. Figure 3 shows this cestode. This specimen was slightly flattened and stained with paracarmine. The head is composed of four bothria and the margin of each is armed with closely set spines or spicules. The proboscides are retracted within the sheaths and each proboscis is connected to a muscular retractile bulb. These bulbs, which control the extension and contraction of the proboscides, average about 0.8 mm. in length. The central part of the appendix is densely granular and stains a deep red with the paracarmine, as does the retractile papilla.

In all probability the mature stages of this species will be found in the spiral valves of some species of elasmobranch. Except for the shape of the proboscides and arrangement of the hooks, *Nybelinia lamonteae* closely resembles *Tetrarhynchus narinari* MacCallum, 1917, an adult form found in the spiral valves of the ray, *Aetobatis narinari*. According to Dollfus (1930) *T. narinari* is synonymous with *Nybelinia robusta* (Linton) (= *T. robustum* Linton, 1891).

One other species of *Nybelinia* has been found in the swordfish. In 1925, Linton reported the finding of several cysts of *T. bisulcatum* (Linton, 1891) (= *Rhynchobothrium bisulcatum*, 1889) on the viscera, and a few scoleces in the digestive tract probably introduced with food. Again, according to Dollfus (1930), *T. bisulcatus* is a synonym of *Nybelinia bisulcata* (Linton). The adults of this species have been found in the stomach of *Carcharhinus milberti*, *C. obscurus*, *Galeocerdo articus* and *Squalus acanthia*. MacCallum (1921) also found the mature stage in the stomach of *Cestracion zygaena*.

Several other species of cestodes have been recorded for the swordfish. Linton (1925) found a few larval cysts of *Otobothrium crenacolle* Linton, 1891 and *O. dipsacum* Linton, 1896 in the peritoneal coating of the pyloric caeca and viscera. The adult of *O. crenacolle* has been reported from the spiral valves of sharks, while that of *O. dipsacum* is not as yet known. The members of the genus *Otobothrium* are characterized by the presence of two ciliated pits at the posterior border of each of the two bothria. The proboscides are four, terminal, filiform, armed, and retractile into a neck.

A great variety of larval forms, the exact taxonomic positions of

which are not known, have been described from the swordfish. They have been placed under a group name designated by Rudolphi as *Scolex polymorphus*. These are usually found in the intestine of the host, and are in all probability that stage in the life-history intermediate between the one found in the Arthropod or Molluscan hosts (procercoid) and the final larval stage in the swordfish (plerocercoid). These may develop into any of the above mentioned larval cestodes and the final, or adult stage may be found in some species of elasmobranch.

Fig. 5. *Contracaecum incurvum* (Rudolphi). About × 2

NEMATODES

V.—**Contracaecum incurvum** (Rudolphi, 1819)

Figure 5

Ascaris incurva Rudolphi, 1819

The members of this genus have the following characters: interlabia present, usually well developed; dentigerous ridges absent; esophagus with reduced posterior ventriculus, giving off a solid posterior appendix; intestinal caeca present; male without definite caudal alae; three to four pairs of postanal papillae (may be doubled), and numerous preanal papillae; spicules equal; gubernaculum usually

absent. In the female the ulva is present in the anterior part of the body; oviparous.

The parasite has long been known from the swordfish. It was present in both Cobbold's (1867) and Linton's (1899) collection of worms taken from this host. Walton (1927) found the parasite in the Leidy collection, which he revised. It was Baylis and Daubney (1922) who definitely allocated this species and placed it in the genus *Contracaecum*. Yorke and Maplestone (1926) and Walton (1927), also refer to it as *C. incurvum*.

The present collection contained 16 specimens, varying in size from 15 mm. to 110 mm. in length; from 0.45 mm. to 0.76 mm. in width. The body is finely striated and serrated at the margins. Head truncate 0.3 mm. in length and width. Esophagus 0.15 mm. in diameter; ventriculus 0.16 mm. in diameter; esophageal appendix 3.5 mm. in length. Distance from the cloacal opening to the tip of the tail 1 mm.; tail tapering sharply, measuring about 0.4 mm. in length. Ventral surface of the caudal region, forward from the cloaca, cuticle raised into ridges. 15 to 16 pairs of preanal papillae; one pair of adanal papillae; 2 ventral and 2 lateral postanal papillae.

COPEPODS

Several species of copepods have been described from the swordfish, but only one species was present in this collection.

VI.—**Pennella filosa** (Linnaeus)

Pennatula filosa Linnaeus, 1758
Penella plumosa of Linton, 1925

Wilson (1917) redescribed the parasite and referred to it as *Pennella filosa*. According to this investigator, *Pennella plumosa* (De Kay) is synonymous with *P. sagitta* (Linnaeus), both reported from *Diodon*. The form referred to by Linton (1925) as *P.* (*Penella*) *plumosa*, in the writer's opinion, is *P.* (*Pennella*) *filosa* since this form is consistently found on the flesh of the swordfish.

The members of this genus have the following characters for the female, according to Wilson (1932): trunk straight; legs close together near the head; ovisac filiform, eggs uniseriate; abdomen with feather-like processes.

One specimen in the collection. The head is wider than long, truncated at the anterior end, and possessing papillae of uniform size and distribution. Total length 180 mm.; neck 85 mm. in length and 3

mm. in diameter; trunk 65 mm. in length and 6 mm. in width; abdomen 30 mm. in length. Plumules profusely branched. Egg strings 200 mm. in length (broken), usually twice the body length.

Wilson (1917) described another species of *Pennella* from the swordfish which he called *P. instructa*. This form differs from the one above in that the head possesses concave lateral margins and the papillae are in definite area only; plumules 24 on each side of the abdomen and dichotomously branched.

Several other species of copepods have been described from *Xiphias gladius*, and like the majority of forms are not host specific. Both *Caligus rapax* Milne-Edwards 1840 and *C. chelifer* Wilson (1905 *b*) were found to occur on the body surface of the host. The members of this genus have the following characters: head fused with the first three segments, fourth segment free with the dorsal plates lacking; genital segment also without dorsal plates; abdomen 1- to 4-segmented. Frontal plates with lumules; first and second antennae 2-segmented; maxillae simple spines; first and fourth legs uniramose; second and third legs biramose. Rudiments of a fifth and sometimes sixth pair of legs on the lateral margins. Egg string often longer than the entire body.

In *C. rapax* the genital segment is wider than long; abdomen 1-segmented; dorsal surface with irregular pigment spots, while in *C. chelifer* the genital segment is as long as wide or longer; no pigment spots on the dorsal surface; abdomen 2-segmented, three times as long as wide.

Gloiopotes ornatus is another copepod parasite described from the swordfish by Wilson (1905 *a*). It is the only member of the genus and has the following characteristics: head fused with the first three thoracic segments and covered with a carapace as in the Caligidae; no lumules; fourth segment with a pair of dorsal plates, which overlap the genital segment and the basal segments of the fourth leg; genital segment in the female produced at each posterior corner into a curved process, carrying a serrated styliform appendage on its outer margin; in the male without processes, but with styliform appendages attached directly to its sides. Abdomen slender, 2-segmented; caudal rami filiform. First and fourth legs uniramose, second and third biramose, rami 3-segmented; terminal claws on first leg tripartite; furca compound, its branches bifid.

One copepod that seems to be specific for the swordfish was described by Steenstrup (1861) as *Philichthys xiphiae*. Linton (1899) and Wilson (1932) reported the parasite which is found free in the mucous canals of the head. These copepods are easily recognized by their external appearance. In the female the head is separated from the first segment

and is small, rounded, without carapace; no neck; trunk elongated, narrowed posteriorly, and distinctly segmented, each segment being subdivided and all of them, including the head, have paired lateral and ventral processes which curve downward and inward. Anterior thorax swollen and orbicular, posterior portion cylindrical and tapered backward; abdomen short and segmented; no caudal rami. Antennae, mouth parts, swimming legs entirely absent. In the male the body is slender, cylindrical, segmented; head separated from the first segment, without a carapace; first and second thoracic segment as wide as the head, the others considerably narrower; abdomen made up of four segments; caudal rami elongate and cylindrical. First antennae 6-segmented; second antennae 2-segmented, each tipped with two claw-like spines; second maxillae stout and armed with strong spines; maxilliped small.

In his list of swordfish parasites, Goode (1880) mentions three species of copepods, two of which, *Pennella costaii* and *Brachiella remosa*, named by Richiardi, 1880, must remain as *nomen nudum* because no figures or descriptions were given. The third species, *Chondracanthus xiphiae* Guérin, which lives on the gills, was reported by Milne-Edwards (1840). The female members of this genus, according to Wilson (1932), have the following characters: head small, separated from the thorax by a constriction; first two segments free, rest of thorax fused with lateral knobs and dorsal laminae; legs uniramose, end segments boot-shaped.

CESTODA

PSEUDOPHYLLIDEA: *Dibothrium plicatum* Rudolphi

TETRARHYNCHIDEA: *Dibothriorhynchus attenuatus* (Rudolphi); *Tentacularia coryphaena* Bosc; *Nybelinia lamontei*, new species

NEMATODA

Contracaecum incurvum (Rudolphi)

COPEPODA

Pennella filosa Linnaeus

SUMMARY

One new and five previously described species of parasites were taken from the swordfish by the American Museum-Lerner Expedition at Louisburg, Nova Scotia, in the summer of 1936. These are as follows: Cestoda: PSEUDOPHYLLIDEA, *Dibothrium plicatum* Rudolphi; TETRARHYNCHIDEA, *Dibothriorhynchus attenuatus* (Rudolphi), *Tentacularia coryphaena* Bosc, *Nybelinia lamontei*, new species, Nematoda, *Contracaecum incurvum* (Rudolphi). Copepoda, *Pennella filosa* Linnaeus.

Other species of parasites from the swordfish reported in the literature are also discussed.

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